3. Sketch the Electromagnetic spectrum labeling the different types of waves. (Include visible light and all its individual colors) Label on your drawing where energy, and frequency are highest. Also label where the wavelengths are the longest. (See attachment for spectrum and label parts etc it's asking)

SEE YOUR NOTES!

4. Define and give an example of:

thermal energy: HEAT ENERGY - THE TOTAL AMOUNT OF KINETIC ENERGY OF THE PARTICLES IN AN OBJECT
EX- A WARM CUP OF COFFEE HAS MORE THERMAL ENERGY THAN ICE WATER

temperature A MEASUREMENT OF THE AVERAGE KINETIC ENERGY OF THE PARTICLES IN A OBJECT. THE STEAK IS 165°

heat transfer: occurs when HEAT is lost to surrounding environment. Moves from

WARM to COLD objects.

5. Draw, explain and give examples of each of the following thermal energy transfers:

Conduction: When TWO OR MORE materials are touching and heat is transferred from one to another.

~~Metals are good conductors true or false~~

Convection (density's role): Is the MOVEMENT of liquids and gases in a convection current. HOT air rises while COLD air sinks.

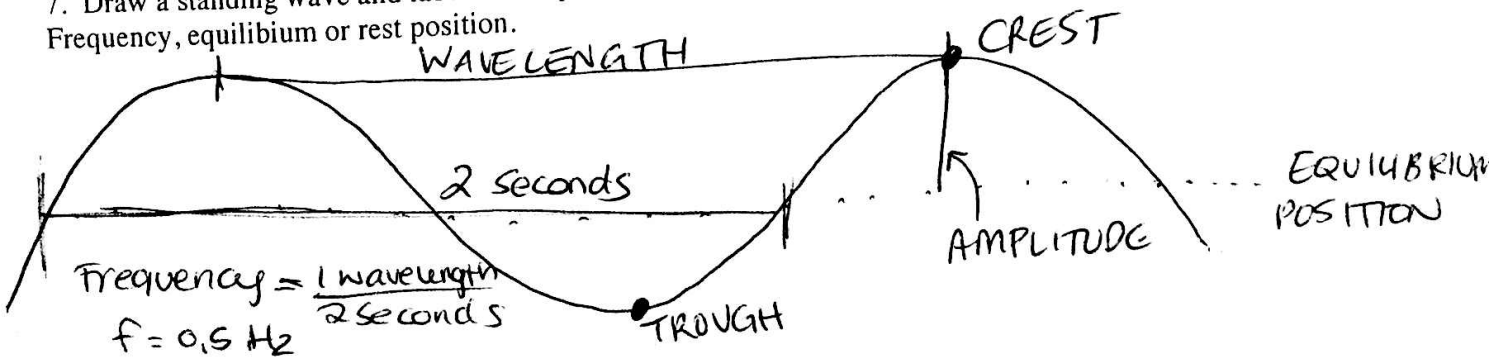
Radiation: energy that is transferred as ELECTROMAGNETIC waves such as visible light and infrared LIGHT

6. Compare and contrast a transverse wave to a compressional/ longitudinal wave:

Transverse wave: movement of a wave PERPENDICULAR to the medium, examples are OCEAN WAVES

Longitudinal/compression waves: movement of waves that move PARALLEL or along the medium. Examples are: SOUND WAVES

7. Draw a standing wave and label and explain the following; Crest, Trough. Wavelength. Amplitude, Frequency, equilibium or rest position.



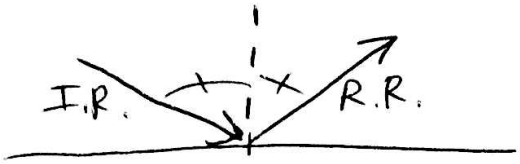
8. Compare and contrast mechanical waves to electromagnetic waves.
Mechanical waves: Need a MEDIUM to travel. They are found ~~is~~ as sound WAVES

Electromagnetic waves: Electromagnetic spectrum, vary in wavelength, FREQUENCY and energy. Don't need a MEDIUM, therefore can travel in A VACUUM

9. Draw, explain and give an example of the ways waves interact:

Reflection: angle of INCIDENCE is equal to the angle of REFLECTION

Reflective ray is (away/towards) the normal.



Refraction: BENDING of waves from one MEDIUM to another.

10. Define the following terms dealing with motion
a. Frame of reference:

b. Force: A PUSH or pull on an OBJECT

c. Balanced Force: forces that are EQUAL IN MAGNITUDE, OPPOSITE IN DIRECTION causes no ACCELERATION or constant SPEED

d. Unbalanced Force: forces that are unequal, therefore resulting is ACCELERATION in one direction or another.

e. Net Force: Adding or SUBTRACTING forces on an object and the result is is the net FORCE

f. Force diagram or Free body diagram/Adding or Subtracting forces

g. Speed: amount of distance over total TIME

h. Average Speed: total DISTANCE divided by total TIME

i. Constant Speed: an object is neither SPEEDING up or slowing DOWN

j. Velocity: when an objects speeds up or is SLOWING down and has a change in DIRECTION

k. Acceleration: CHANGE IN VELOCITY OVER TOTAL TIME

l. Friction: anything that opposes MOTION. Examples are air RESISTANCE and SLIDING FRICTION

m. Inertia: objects in MOTION tend to stay in motion, while things at REST tend to stay at REST unless acted upon by a net/unbalanced FORCE

n. Weight compared to Mass: Mass is the amount of MATTER in an object, whereas weight is the amount of GRAVITATIONAL pull on an object.

o. Gravity: amount of pull on an OBJECT, usually the number $9.8\ m/s^2$ is assigned to it.

p. Newton: discovered the THREE laws of motion (hint make sure you know all the laws)

q. Joule: unit given for KINETIC ENERGY or POTENTIAL ENERGY

r. Kinetic energy: energy of MOTION. Written as KE $=1/2mv^2$

s. Gravitational Potential energy: POSITION energy or depends on the HEIGHT of the object. The HIGHER the object the more potential ENERGY

t. Law of Conservation of Energy : energy is neither CREATED nor destroyed.

10M

Testing Your Knowledge and Terminology: Use scientific terms to fill in the blanks below.

1. Objects at rest will remain at REST, and objects in motion (in a STRAIGHT line at a constant SPEED) tend to remain in MOTION unless acted upon by an NET (UNBALANCED) force.

This statement is also known as Newton's 1ST law of motion.

2. If an object is speeding up, slowing down or changing direction the object is ACCELERATING

3. INERTIA is the natural tendency of an object to remain at rest or to remain moving with constant speed.

4. Velocity is speed in a given DIRECTION.

5. A FORCE is a push or pull.

6. If you have an unbalanced force on an object, the object will ACCELERATE.

7. Force is measured in NEWTONS.

8. The formula for force is F=MA.

9. Weight is a product of its mass and its acceleration due to GRAVITY

10. Acceleration due to gravity here on Earth is 9.8 m/s^2.

11. If a force remains constant and the mass of the object is increased, according to Newton's 2ND law of motion, the acceleration of the object will BE SMALLER / LESS

12. If the mass of an object remains constant and the force applied to the object is increased, the acceleration of the object will BE LARGER / GREATER

13. According to Newton's 3rd law of motion, forces always occur in PAIRS. For every applied force their is an EQUAL and OPPOSITE force.

14. When you push down on a step to go up the stairs, the STEP pushes back on you.

Formulas, Equations, and Other Fun Things To Know & Practice

If you would like this worksheet to help you study for the exam, be sure to write out the formulas, show all your work, and LABEL your answers. Answers only will not be of much help when trying to look for how to solve a problem.

Distance	Time
10 meters	2.03 sec
20 meters	3.89 sec
30 meters	5.19 sec

Use the above information to calculate and answer questions 1-3: **make sure you subtract the time from previous ones to find out time during each interval.**

1. What is the split time for each interval & what is the average speed for the interval.

Interval (Split)	Average Speed (m/s)
0-10 meters	$\frac{10}{2.03} = 4.93\ M/S$
10-20 meters	$\frac{10}{1.86} = 5.38\ M/S$
20- 30 meters	$\frac{12}{1.3} = 7.69\ M/S$

Speed= the distance divided by time (d/t)

2. What interval has the fastest speed? 20-30 M

3. What is the object's average speed for the entire distance? Show your work. (total distance over total time)

$$S = \frac{d}{t} = \frac{30m}{5.19s} = 5.78\ M/S$$

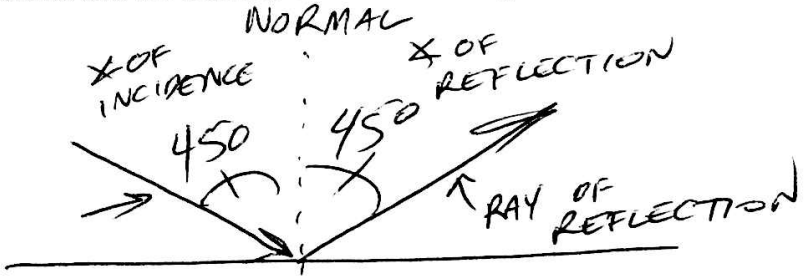
4. If the frequency of a wavelength is 32 hertz, the wavelength is 10 meters and the amplitude is 5 meters, what is the speed of the wave? Show all your work and label your units. Speed= wavelength x frequency

Speed= 320 M/S

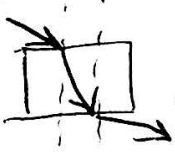
Wavelength= 10m

Frequency= 32 Hz

5. Draw a plane mirror and show correctly how a laser or ray is reflected off the mirror. Label the ray of incidence ray of reflection and the normal. Measure both angle of incidence and reflection to prove that your drawing is correct.



6. Show how a laser or ray can be refracted through an acrylic block. Explain how one knows if the light is speeding up or slowing down through a medium?



IF RAY BENDS TOWARDS THE NORMAL THE WAVE IS SLOWING DOWN - IF IT BENDS AWAY FROM THE NORMAL ITS SPEEDING UP

7. What are some factors that determine the speed of a wave through a medium? Be specific.

DENSITY

8. Take two identical objects that look like rocks. One is a real rock that has a very large mass and the other is a styrofoam rock that has a very small mass:

Which one will fall faster? THE REAL ROCK (DUE TO SURFACE AREA & AIR RESISTANCE)

Which one will accelerate faster if pushed with an equal amount of force across the room?

STYROFOAM ROCK

Which one will weigh more?

REAL ROCK

Which one has more inertia?

REAL ROCK

9. If a football player has a mass of 123 kg and net force of 861 Newton's, what is his acceleration? F=MA

F= 861 N

M= 123 kg

A= 7 m/s2

$$\frac{861\ N}{123\ kg} = 7\ m/s^2$$

10. If a car can go from 0 m/s to 60m/s in 30 seconds, what is it's rate of acceleration?

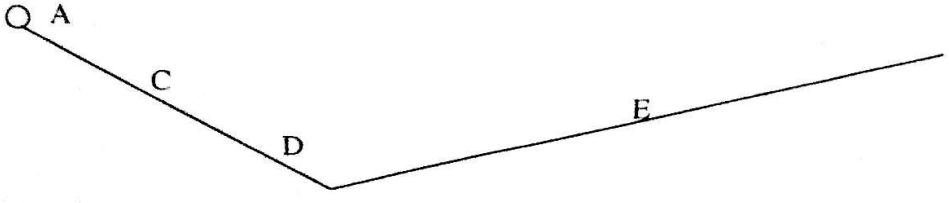
$$A = \frac{\Delta V}{\Delta t} = \frac{60\ m/s}{30s} = 2\ m/s^2$$

11. Draw a force diagram of an object that was tossed into the air.

GOING UP — AIR RESISTANCE, GRAVITY

GOING DOWN — AIR RESISTANCE, gravity

Look at the diagram below to answer questions 12-14:



2. Place the letters in order from LOW Kinetic energy to high K.E. ~~RRD~~ ACED

3. If the ball has a mass of 22kg and it is at a height of 12 meters at letter A, what is its G.P.E.? Show work below.

$PE = 22kg \cdot 12m \cdot 9.8 m/s^2$

14. What is the total energy at position E? 2587.2 J

15. Look at the following diagram and explain what will happen to the ball on the right side if there is NO friction.

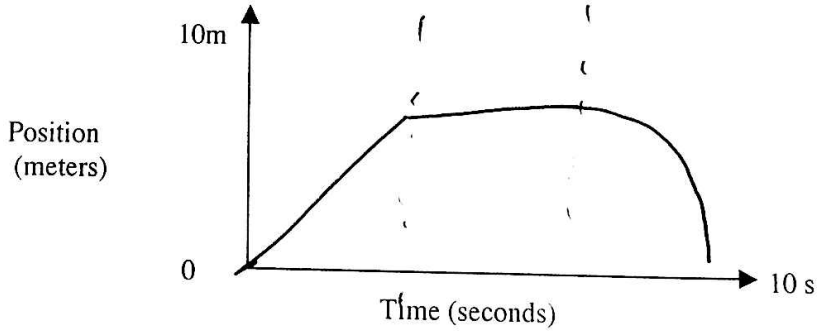
Explain below:

THE BALL WILL ROLL UNTIL IT REACHES THE SAME HEIGHT ON THE OTHER SIDE THEN IT WILL ROLL BACK TO THE ORIGINAL POSITION & CONTINUE THIS MOTION UNTIL SOMETHING STOPS IT.

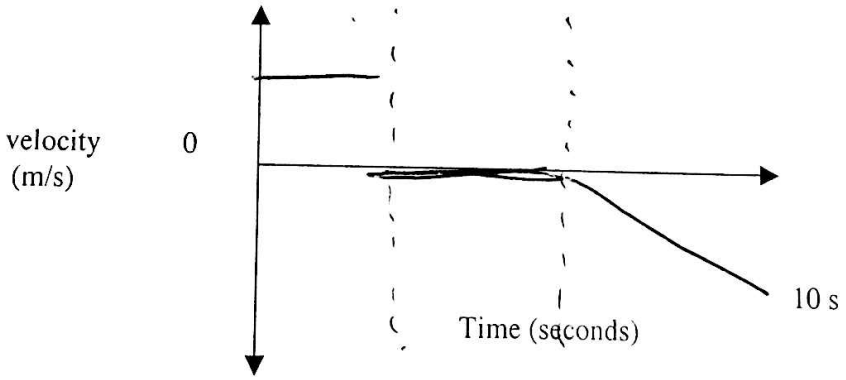
16. Look at the above picture. What would happen if there were friction. Explain.

IF FRICTION WERE PRESENT IT WOULD REACH A LOWER HEIGHT ON THE OPPOSITE SIDE. THIS WOULD HAPPEN UNTIL THE BALL STOPS COMPLETELY

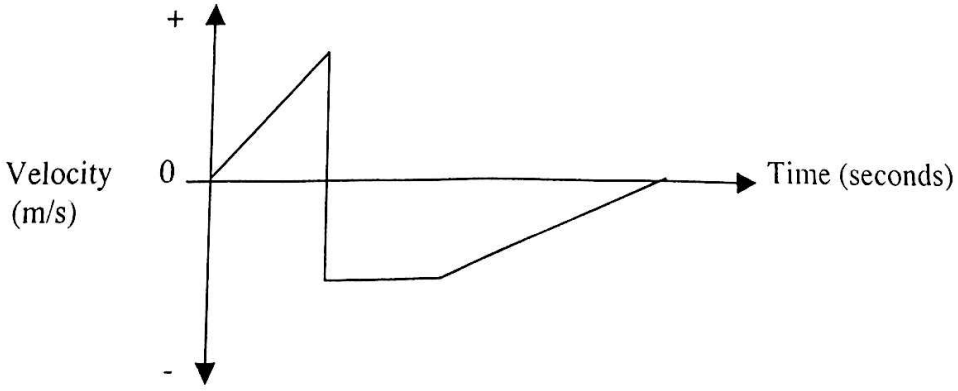
17. Draw a position-time graph that shows an object moving at a fast constant speed away from the origin, stopping for a few seconds then accelerating toward the orgin (slow to fast).



18. Draw the same situation in #17 on a velocity-time graph.



21. Look at the velocity-time graph below and write out the motion of the object. Be sure to explain if the motion is toward or away, constant or accelerating.



Explain the motion: THE OBJECT ACCELERATES AT A CONSTANT RATE FROM THE ORIGIN. IT TURNS AROUND AND MOVES AT A CONSTANT VELOCITY AND FINALLY ACCELERATES AT A CONSTANT RATE BACK TO THE ORIGIN

22. State and give an example of Newton's 1st Law of motion.

AN OBJECT IN MOTION STAYS IN MOTION AND AN OBJECT AT REST STAYS AT REST UNLESS ACTED UPON BY AN UNBALANCED FORCE
→ A PIECE OF PAPER WILL STAY ON A TABLE FOREVER UNLESS A FORCE

State and give an example of Newton's 2nd Law of motion.

F = M · a ; a = F/M AN OBJECTS ACCELERATION IS DIRECTLY DEPENDENT ON FORCE AND INDIRECTLY DEPENDENT ON MASS WITH THE SAME FORCE AN F-350 ACCELERATES SLOWER THAN A HONDA FIT

State and give an example of Newton's 3rd Law of motion.

FOR EVERY ~~R~~ACTION THERES AN EQUAL AND OPPOSITE REACTION. FOOT PUSHES ON THE FLOOR - FLOOR PUSHES BACK ON FOOT

Be sure to know the following concepts and how they relate to physics and the activities we did in class. Use your past notes, labs activities and assessments to review these concepts.

Know the 3 key pieces of evidence that support the Big Bang Theory.

Understand the difference between fusion and fission. (What happens to the "lost" mass in nuclear fusion)?

Be able to determine average speed, split time and acceleration of an object.

Understand position-time and speed-time graphs.

Know the definitions for conduction, convection and radiation. Know how they work in terms of energy transfer. Be able to give or identify examples of each.

Know what an independent variable, dependent variable, constants and control is in an experiment. Be able to identify each or write an experiment using each appropriately.

Know the difference between compressional (longitudinal) and transverse waves. Be able to label the parts of a wave and be able to determine its speed, frequency or wavelength.

If you have any questions while taking the exam, PLEASE ask your teacher for clarification. They can't give you the answer but they can help you understand what is being asked. Be sure to get a good night sleep before the exam and eat a healthy breakfast before you come in.

The Physical Science teachers would like to thank each and every one of you for all the effort and time you have put into this class. Please stop by and visit next year and let us know how you are doing in Biology (or any other science class you might be taking). NOW before you think you are done - **Go back and double check all your answers to be sure you have not made any careless mistakes. Did you show all your work and label all your answers correctly? DO NOT LEAVE ANYTHING BLANK….. ask for help!**